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Stress in Swine

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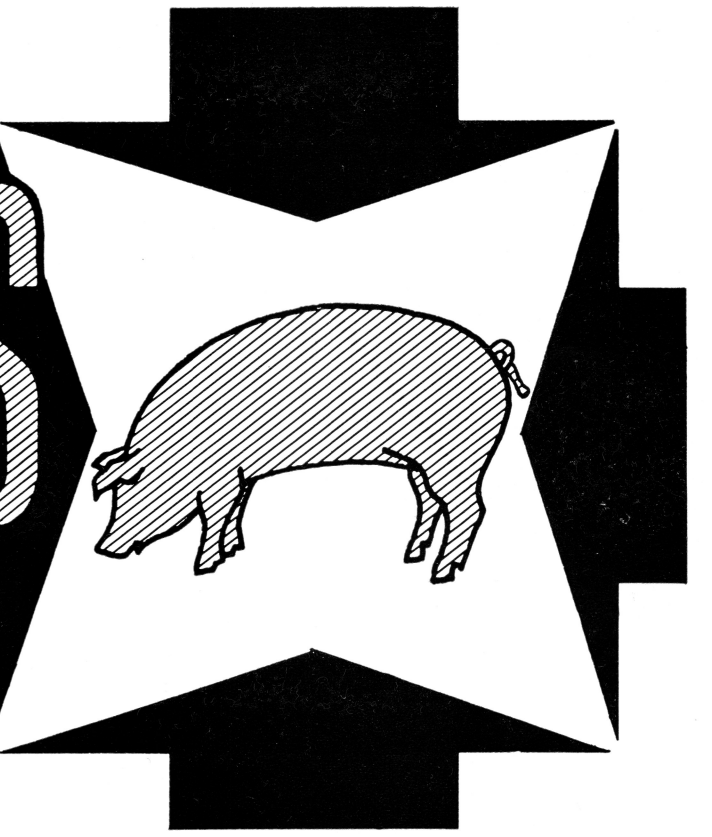

by D. G. Topel, Lauren L. Christian and K. S. Preston

MAN IS NOT the only animal to feel stress from the pressures of today's living. There's increasing evidence that the pig—or, at least some pigs—are susceptible to stress.

Stress in swine may cause anything from an undesirable pork product to sudden death of market-size animals. The over-all term for the stress problem is "porcine stress syndrome" or PSS. One type of reaction to stress produces a pale, soft, exudative or watery carcass, referred to as PSE or PSW.

In recent years, the veterinary clinic at Iowa State University has observed increasing numbers of unexpected deaths in market-size pigs. The deaths have occurred on farms where management, breeding and feeding practices are above average. Often the producer encountering these difficulties is one who is especially interested in improving the quality or meatiness of the swine.

PSS is not associated with any known infectious disease, and there is no certain treatment. PSS appears to be a shock-like reaction that may occur when animals are stressed in routine handling.

Pigs susceptible to stress are often those that produce a high ratio of lean to fat. Such stress-prone pigs cannot adapt to stress situations and cannot stand even minor stress. Sudden deaths have occurred when stress-prone swine were removed from confinement housing and moved to new quarters. Dead hogs frequently may be found as a result of minor stress during transportation from farm to market. Many deaths follow a sudden rise in atmospheric temperature or a rapid change from cold to warm environment.

Probably the most common cause of stress is fighting. Whenever strange hogs are mixed, there is a struggle to establish the social order of the pen, and susceptible hogs have died within 2 minutes of such stress.

Deaths from stress usually occur without warning, but in most cases there was a recent stressing experience. Stress signs develop rapidly. The first indication of an impending stress attack is a rapid tremor of the tail when the pig is aroused or excited, but this clue requires close observation.

Difficulty in breathing usually occurs next and may become severe, with affected pigs developing open-mouth breathing. Body temperature rises during this phase, and irregularly shaped alternating areas of blanching and redness or flushing develop in the skin. Finally the pig becomes reluctant to move. If stress continues, it will collapse and die often within minutes after the initial signs of stress are noticed. Rigor mortis develops almost immediately.

Animals that die from stress have the pale, soft exudative muscle

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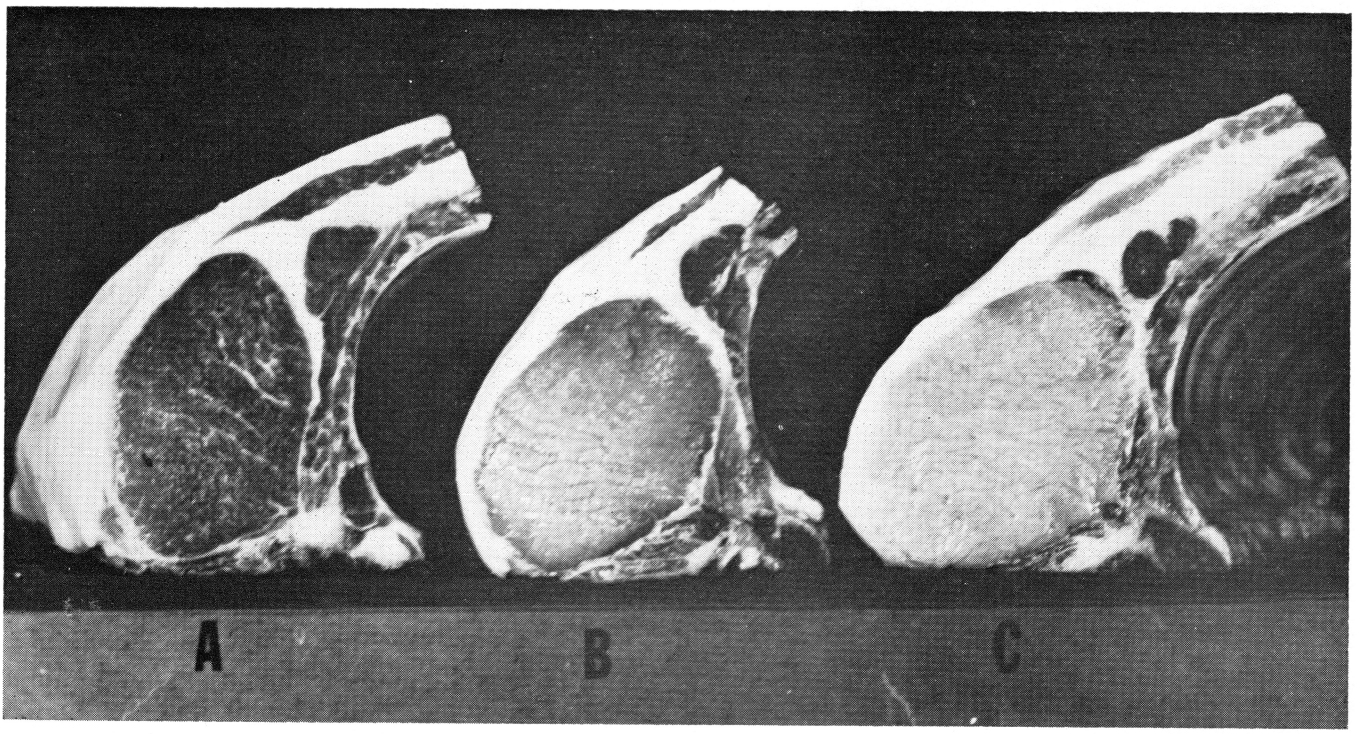

MUSCLE COLOR CHANGES are contrasted here. Loin A has normal desirable color and firmness. Loin B is intermediate in these characteristics and loin C has the undesirable soft, pale, exudative muscle from a stress prone animal. The latter is one result of stress in swine.

that has a high lactic acid content (low *p*H). Animals that have survived stress attacks have high muscle *p*H values, and the muscle is dark in color when slaughtered one day later.

A survey of Iowa purebred swine breeders revealed that about one-third had experienced losses with stress-like symptoms. In addition, the stress syndrome appears related to a problem of PSE pork from animals slaughtered in the usual manner.

PSE pork has been estimated to cost the swine industry millions of dollars. Such pork is not desirable from the consumer's standpoint and in addition has a higher shrink. Scientists are certain the physiological response to stress is important in explaining many characteristics of the pork muscle after death.

Veterinarians examining hogs that died from stress were puzzled at first by the lack of clues to the cause of death. Abnormal tissue changes commonly associated with infectious or toxic agents are missing. Not until emphasis was placed on skeletal muscle changes did a pattern begin to emerge.

In the pigs killed by stress, a cross section of the ham revealed a two-toned effect with certain muscles being pale and watery. The high lactic acid content of the muscles may indicate an upset in the balance of adrenal hormones when under stress. These hormones (adrenalin is one) aid the body in adjusting to stress conditions.

An adrenal insufficiency sometimes is observed and may be associated with a partial circulatory failure. This is indicated by the alternate blanching and flushing of the skin of pigs under stress. Under stress, body tissues produce histamines which tend to dilate blood vessels. The adrenal hormones tend to offset some of the effects of the histamines, so that with adrenal insufficiency the body may fail to correct the progressive dilation of small blood vessels during stress. This could result in the blood pooling in the muscle, allowing a buildup of metabolic substances such as lactic acid.

Because the stress-prone animals seem to be those that are muscular and usually have small backfat thickness, it is possible that genetic selections for the efficient pig also resulted in selection for lower secretions of adrenal hormones and the lack of adaptability to stress conditions. Although more study is needed before positive conclusions can be made, breeders who encounter the sudden death problem can take some precautions based on present knowledge.

So far, attempts to save swine showing signs of stress have not produced consistent results. Tranquilizers and injection of adrenal hormones, both singly and in combination have been tried and a few animals recovered. However, not enough animals have been treated to make any claims for cure.

Swine breeders should handle carefully any animals that are easily excited and show the classical sign of muscle or tail tremors. Whenever possible, these animals should not be mixed with strange hogs. Fighting, changes in environment, estrus or increase in atmospheric temperature may cause stress sufficient to trigger the reaction. Overcrowding on trucks and long hauls to market account for many deaths due to stress and should be avoided.

In addition, because stress seems to be affected by genetic background, the condition may be partially controlled at least by selecting breeding animals that do not exhibit signs of this condition.